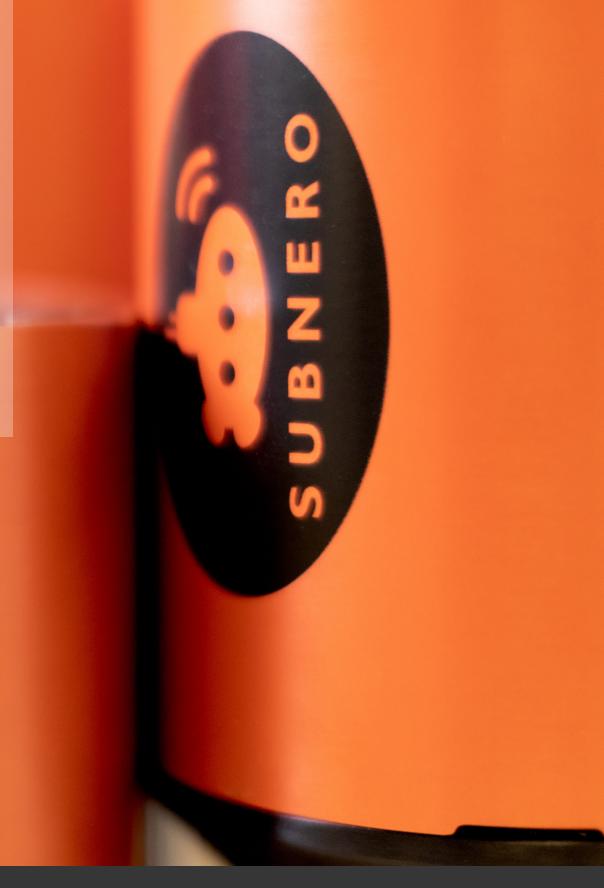# SUBNERO M25M SERIES MODEMS

Fourth generation software-defined acoustic modems with class leading performance

KEY FEATURES

- Up to 15 kbps data rate
- More than 4 km communication range in shallow waters
- Deep sleep state with <1 mW power consumption
- Supports localization & ranging with 1 m precision
- Support for arbitrary waveform transmission and recordings
- Enhanced performance with additional receiving channels

SUITABLE FOR

- Frequent ADCP data retrieval for long term deployments
- Localization and communication for underwater inspection

BEST-IN-CLASS PERFORMANCE

Subnero's M25M series modems can be configured dynamically (in the field) to operate with high data rates (up to 15 kbps) or longer communication ranges (more than 4 km) or a combination of both, to provide best-in-class performance in tropical, warm and shallow waters.

SDOAM POWERED BY UnetStack4

Being software defined open architecture (SDOAM), the M25M series modems offer unprecedented flexibility to the user for integrating with other platforms (e.g. ADCP), dynamically configuring to avoid interference with other acoustic devices, and keeping up-to-date with regular software updates.

NETWORKING AND LOCALIZATION READY

Engineered for building large underwater networks, multiple M25M series modems can form distributed or cellular-like centralised networks. Such networks with handover, relaying, routing and tracking capabilities can provide support for communication and localization applications.

SPECIFICATIONS - M25M Series Gen4

	Edition	Platinum Edition		Silver Edition		Research Edition
	Configuration	Standalone	Embedded	Standalone	Embedded	Standalone
	Model number	WNC-M25MPS3	WNC-M25MPE3	WNC-M25MSS4	WNC-M25MSE4	WNC-M25MRS4
Performance	**Data rate**	Up to 15 kbps (depending on channel conditions and reliability requirements)				
	Operating range	3-5 km (nominal, depending on channel conditions)				1 km (nominal, depending on channel conditions)
	Ranging precision	0.1 m				
	Doppler resilience	±4 knots or better				
	Modulation (software defined)	PSK-OFDM, FH-BFSK				
	FEC (Forward Error Correction)	LDPC, up to $1/6$ rate code; Convolution code, $1/2$ rate code (JANUS)				
	Carrier frequency	24 kHz				
	Bandwidth	12 kHz (20 - 32 kHz)				
Software	**Software framework**	UnetStack4 (www.unetstack.net)				
	Software interface	UnetStack4 (Java, Groovy, Python, C, Javascript, Julia, Matlab), interactive web UI, JSON/TCP				
	Arbitrary waveform transmission	Passband & baseband				
	Arbitrary waveform recording	Passband & baseband				
	JANUS compatibility	Yes, subject to operating frequency band				
Electrical	**Hardware interface**	Ethernet (10/100 Mbps), RS232 (up to 115200 bps), power		Ethernet (10/100 Mbps), power		
	Power consumption	< 4 W (receive mode, nominal) < 60 W (transmit mode, avg.) < 80 W (transmit mode, max.) <1.5 W (sleep mode)		< 4 W (receive mode, nominal) < 45 W (transmit mode, avg.) < 80 W (transmit mode, max.) < 1 mW (deep sleep mode)		< 4 W (receive mode, nominal) < 25 W (transmit mode, avg.)
	Power source	External power: 22 – 28 V DC (24 V DC recommended)				
	Onboard storage	Not available		32 GB		32 GB
	Wake up support	Included (acoustic, Ethernet, RS232)		Included (Scheduled, External/GPIO)		Not available
	Underwater connector	13-pin	n/a	13-pin	n/a	8-pin
Mechanical	**Operating depth**	300 m (Aluminium hull)	2000 m (Transducer)	300 m (Aluminium hull)	2000 m (Transducer)	100 m
	Dimensions	ø 127 X 400 mm	90 X 90 X 180 mm	ø 127 X 270 mm	ø 105 X 150 mm	ø 127 X 270 mm
	Weight (in air / water)	6.0 / 2.5 kg	1.0 / n/a kg	5.0 / 1.5 kg	1.5 / n/a kg	4.0 / 1.0 kg
	Operating Temperature	0 to 50 °C	0 to 70 °C (Electronics) 0 to 50 °C (Transducer)	0 to 40 °C	0 to 70 °C (Electronics) 0 to 40 °C (Transducer)	0 to 40 °C
	Qualification testing	MIL-STD-810G, MIL-STD-810E, MIL-STD-461E		Not applicable		
Options	**Optional Accessories and Upgrades***					
	Additional channels	Not available		Up to 3		Not available
	Coprocessor	Not available		nVidia Jetson TX2 based SBC		Not available
	Sensors	Not available		GPS, compass		Not available
	Storage	Not available		256 GB, 1 TB		Not available
	External interfaces	Not available		RS232 (up to 115200 bps)		Not available
	Software Upgrades	Unity** (Distributed spatial diversity framework for improved communication performance)				Not available
	Hull options	Not available	n/a	2000 m (Stainless steel), 4000 m (Titanium)	n/a	Not available
	Data & power cable	25 m underwater cable	1 m Ethernet, power & transducer	25 m underwater cable	1 m Ethernet, power, 5 m transducer	25 m underwater cable
	Mounting clamps	Optional	n/a	Optional	n/a	Optional
	Customer support	Phone/Email		Email/Online forums		Online forums

SILVER EDITION

WNC-M25MSS4, WNC-M25MSE4

Subnero's silver edition modems are designed to provide high-performance underwater wireless communication and localization features in all kinds of environments. They are available in different configurations such as standalone, embedded, and multichannel to support a variety of operational needs and use cases.

RESEARCH EDITION

WNC-M25MRS4

Aimed directly at academic researchers and underwater technology enthusiasts, our research edition underwater modems are designed to bridge the gap between developing applications using a simulator (e.g. Unet simulator) and high-end commercial deployments. Due to their low cost, these modems provide an easier entry to the world of underwater communications to any underwater technology enthusiasts.

OPTIONAL ACCESSORIES AND UPGRADES

In addition to the various editions and configurations, the Subnero WNC series of products support a rich ecosystem of optional accessories and upgrades starting from battery packs, underwater cables to additional receiving channels, additional sensors such as GPS, Compass (AHRS), multiple storage options (up to 1 TB), electrical interfaces and additional coprocessors for deploying user applications, making it one of the most versatile acoustic devices in the market today.